

SECTION 13020 GASKETED CLEANROOM CEILING SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

1.2 SUMMARY:

- A. Section Includes:
 - 1. This Section specifies the requirements necessary to design, furnish, and install the gasketed cleanroom ceiling system. Work shall include the following: gasketed cleanroom ceiling system with support grid, fire sprinkler penetrations, blank filler panels, trim and accessories necessary to create the functional assembly.
- B. Work not included:
 - 1. Electrical
 - 2. Lighting
 - 3. Fire sprinkler
 - 4. Ionization
 - 5. Any Accessories that will be suspended from the ceiling grid.

1.3 REFERENCES/PROJECT REQUIREMENTS

- A. Requirements of the following Project Specification Sections apply to this section:
 - 1. Division 0 – Contract Instructions
 - 2. Division 0 – General Requirements
 - 3. Section 01110 – Cleanroom Construction Protocol
 - 4. Section 01111 – Cleanroom Construction and Cleaning Procedures
 - 5. Section 01112 – Cleanroom Certification and Acceptance
 - 6. Section 13019 – Ceiling Grid Support System
 - 7. Section 13036 – Cleanroom Wall Systems
 - 8. Section 15300 – Fire Suppression Master Specification
 - 9. Division 15 – Mechanical
 - 10. Division 16 – Electrical
- B. Additional project requirements:
 - 1. ASTM C636 – Standard Practice for installation of metal ceiling suspension systems for acoustical tile and lay-in panels.
 - 2. AISI SG 672 – Design of cold-formed steel/structural.
 - 3. ACI 117 – Standard tolerances for Concrete Construction and Materials.

1.4 DEFINITIONS

- A. American Society For Testing And Materials (ASTM).
- B. American Iron and Steel Institute (AISI)
- C. American Concrete Institute (ACI)

1.5 SYSTEM DESCRIPTION

- A. The gasketed cleanroom ceiling grid shall be field assembled from factory-prepared and prefinished components:
 - 1. Support grid.
 - 2. T-bolts
 - 3. Threaded Rod
 - 4. Blank panels.
 - 5. Accessories needed for installation.
- B. Vertical Design and Deflection Requirements:
 - 1. Applied Dead Load: actual weight of ceiling plus sprinklers, lighting, fire protection piping connecting to supported systems, fan filter units, and HEPA filters.
 - 2. Applied Grid Suspended Load: point hanging load from grid runner of 150 pounds per linear foot or a single midpoint grid suspended load of 400 pounds.
 - 3. Deflection: 1/8 – inch maximum grid deflection under full dead load plus applied suspended load.
 - 4. Hangers: shall be suspended from the top or side panel at locations required to align with Ceiling Grid Support system.
 - 5. Structural Safety Factor: A minimum safety factor of 2.5 shall be used for all structural calculations.
- C. System and bracing designs shall be in conformance with applicable building code, including any local amendments and AISI SG 672 Specifications for the Design of Cold-Formed Steel.
- D. System design shall accommodate standard ACI 117 construction tolerances, deflection of building structural members and clearance of intended openings in the structure above.
- E. The support systems shall be suspended from the Ceiling Grid Support System defined in Section 13019. Connections shall conform to the requirements of this Section and the following additional requirements:
 - 1. The grid hangers and bracing shall be aligned to match the ceiling grid support system structure. Maximum hanger spacing each way shall not exceed 4 feet. Maximum tributary area to a single horizontal brace shall not exceed 400 square feet.
 - 2. Hangers and bracing shall be furnished by the installer and shall consist of:
 - a. T-bolts
 - b. Approximate length of Threaded Rods: bottom of turn-buckle shall be level at 36 inches above ceiling height.
 - c. Hangers shall be sized and braced to resist seismic compression loads as required.
 - 3. Ceiling supports beyond those identified on the drawings as required for a complete installation of the ceiling system shall be the responsibility of the ceiling installer who's design shall be in accordance with Section 13019. Ceiling installer shall coordinate the requirements of the additional supports with the mechanical and electrical installations in the ceiling space.
- F. Fire Sprinkler Penetration Placement:
 - 1. Provide penetrations in ceiling grid for sprinkler drop to pass through.
- G. Lighting System Support:
 - 1. Lay-in type lighting fixtures shall be coordinated with the ceiling grid system for dimensions, support, weight, and wiring as required. The grid system shall not impede maintenance of the lighting system which shall be fully maintained from the Cleanroom.
 - 2. Teardrop type lighting fixtures shall be supported from the ceiling grid system. Either a fastener type mounting system shall be employed or direct attachment of the fixture to

the grid shall be accommodated. The mounting method shall be fully coordinated with the lighting fixtures selected. Wiring of the teardrop light fixtures shall be through the ceiling grid. There shall be no exposed raceways below the surface of the grid and wiring may be routed through the grid to light fixtures if the system is UL listed for such use.

- H. Manufacturing Tolerances – Ceiling Grid;
 - 1. Dimensions of Grid: plus zero, minus $\frac{1}{8}$ inch in 24 feet.
 - 2. Squareness of Grid: plus $\frac{1}{4}$ inch, minus $\frac{1}{4}$ inch, measured across the diagonal of a 24-foot by 24-foot area.
 - 3. Accumulative Gain of Ceiling: plus $\frac{1}{4}$ inch, minus $\frac{1}{2}$ inch, measured over installed length of 100 feet.

1.6 SUBMITTALS

- A. Submit the following in accordance with Conditions of Contract and Division 1:
 - 1. Shop Drawings: Indicate fabrication details, joint locations, fittings to accommodate lighting equipment, fittings to accommodate sprinkler penetrations and connection to other work.
 - 2. Samples: Submit samples of each component and accessory to be used on the project.
 - 3. Submit Test reports certifying entire system complies with the requirements set out in these Specifications. Submit UL certifications and listing information as applicable.

1.7 QUALITY ASSURANCE

- A. The owner or its representative shall maintain the right to tour the cleanroom ceiling manufacturer's plant anytime that fabrication is being performed on components intended for this project.
- B. The manufacturer shall notify the owner when production is finished on the first component of each type. Anytime after that date, the Owner or Authorized Representative may exercise the option (giving 24-hour advance notice) to tour the manufacturing plant and inspect for component assembly, painting, cleaning, or packaging to ensure that quality control is being maintained.
- C. Structural framing and support design shall be certified by a licensed professional structural engineer.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Factory requirements for delivery, storage, and handling shall be in accordance with Division 1 of the Specifications.
- B. General:
 - 1. Deliver materials in their original unopened packages.
 - 2. Exercise extreme care in handling components to prevent damage.
 - 3. Store materials in such manner as to prevent damage or intrusion of foreign matter. Conspicuously mark "REJECTED" on materials which have been damaged, and remove from the jobsite.
 - 4. The Owner reserves the right to review the method of packaging and shipment prior to the first shipment.
 - 5. Any units arriving at the jobsite that have not been adequately protected will be rejected by the Owner and must be returned to the manufacturer for replacement at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Ceiling Grid
1. Gordon Inc.
~~B-2.~~ CleanPak International
~~C-3.~~ MW-Zander
- B. Ceiling Blanks
1. WebCore, Inc.
2. Approved Equal

2.2 COMPONENTS

- A. Ceiling Grid:
1. The ceiling grid system shall be a field-assembled (stick-built) 4-foot by 2-foot channel grid constructed of extruded aluminum grid members.
 2. The grid portion of the ceiling support lattice shall be supported with threaded rods (as required) connected to the Ceiling Grid Support System. The grid system shall include sprinkler penetrations providing airtight seals and escutcheons. Furnish two anodized friction plug caps for each head location to seal unused positions.
 3. Sealer plugs, clips, or covers shall be furnished for field installation over all openings in the ceiling assembly left after mounting of all accessories. Reveals to be sealed include air gap next to light fixture frame/lens, sprinkler heads, utility hangers, and empty grid members.
 4. Gasket material is to be "close cell" non-voc (volatile organic compounds) material in dimensions that will ensure proper operation of the clean ceiling system.
- B. Blank Ceiling Filler Panels:
1. Blank ceiling filler panels shall be 1" thick lightweight aluminum honeycomb panel. Top plate of panel to be 0.04" thick minimum diamond plate, mill finish aluminum. Panels shall be designed for a uniform live load of 50 pounds per square foot with a maximum deflection of 0.1" and a concentrated load of 400 pounds with a maximum deflection of 0.1". Panel skins to be bonded to aluminum honeycomb core using 100% solids epoxy. non-walkable. The panels shall be constructed of minimum 0.032-inch aluminum or 14-gauge steel with welded corners designed to affect an airtight seal in the ceiling grid, and shall function the same as the filter module skirt.
 2. Blank panels shall be sited for special conditions and penetrations, such as safety equipment and communication hardware.
 3. Manufacturer shall provide hold-down clips shall be used for positive seal of blank panel edge onto the gasket seal. Clip shall attach to the grid assembly and shall be suitable to resist positive pressure gradient on bottom cleanroom face of panel. Clip may be eliminated where steel panels are used. Clips shall allow the removal of blank panels from below.
- C. Perimeter Infill System:
1. The manufacturer shall provide sufficient quantity of matching grid, custom filters (if required) and blank panels to close the gap between the ceiling modules and the perimeter walls.
 2. Infill system pieces shall include full-width extruded aluminum grid and any other components needed to provide extensions of the grid pattern to the perimeter walls or between modules sections.

2.3 ACCESSORIES

- A. Sprinkler Piping: provided under separate contract as specified in Section 15300, Sprinkler Systems.

2.4 FABRICATION

- A. Grid members shall be attached together to form a structural horizontal frame capable of spanning between lateral braces.
- B. A plugged and gasket-sealed opening shall be provided through the ceiling grid to permit particle counter probe to be inserted into upstream air to measure filter challenge concentration.

2.5 FINISHES

- A. Ceiling Grid: Type 2: Clear Anodized Aluminum finish.
- B. Blank Panels, cleanroom side: static dissipative, roll coat or powder coated epoxy. Color to match cleanroom wall panels.
- C. Perimeter Infill System, blank panels: static dissipative, powder coated epoxy. Color to match cleanroom wall panels.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Setting out alignment of ceiling system shall be based on the building survey points.
- B. Coordinate setting out and alignment and specific requirements of this section with Section 13019 Ceiling Grid Support System.

3.2 ERECTION

- A. All penetrations in the cleanroom ceiling grid shall be predrilled and sealed at the factory.
- B. No field drilling of the ceiling grid will be permitted.
- C. All penetrations through the ceiling plane must be sealed airtight to prevent contaminant migration through the ceiling from the interstitial area into the cleanroom.

3.3 INSTALLATION

- A. The contractor shall be responsible for the complete installation of the ceiling system assembly.
- B. The ceiling system shall be installed to line and true level and with due regard to appearance and structural stability.
- C. The ceiling system shall be suspended directly from Ceiling Support System in accordance with ASTM C636 and the manufacturer's current printed instructions for the type of installation used.
- D. All field assembly and materials shall be provided by the Contractor.

- E. Coordinate ceiling grid installation with other trades, accommodate installation of equipment by other trades, and protect equipment mounted to the ceiling system as if part of the ceiling grid system.

3.4 FIELD QUALITY CONTROL

~~A. Manufacturer's Startup Services:~~

- ~~1. The manufacturer's service representative shall provide representation during initial startup of the cleanroom in the presence of the Owner and Construction Manager's representatives.~~
- ~~2. Upon completion of the inspections, startup, testing, and checkout procedures, the ceiling manufacturer shall submit written notice to the Owner that the units are ready for beneficial use by the Owner.~~
- ~~3. For purposes of this proposal, the bidder shall assume that the entire cleanroom will be ready for startup at the same time.~~
- ~~4. In order to establish the minimum service requirements, a manufacturer's representative for the equipment specified herein shall be present at the jobsite for the minimum man-days listed, travel time excluded:~~
 - ~~a. 10 man-days for performance testing~~
 - ~~b. 10 man-days for startup and maintenance instructional time~~

~~B. Testing and Certification: The entire cleanroom will be balanced and certified per Section 01112.~~

END OF SECTION 13020